REMARKS

Overview of the Office Action

Claim 1-45 have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over co-pending U.S. Patent Application Serial No. 11/063,994 and U.S. Patent Application Serial No. 11/076,232.

The specification has been objected to for not including information regarding all related applications.

Claims 1-45 have been rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention.

Claims 1-45 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Status of the claims

Claims 1-5 and 36-37 have been amended.

Claims 1-45 remain pending.

Objections to the specification

The specification has been objected to for not including information regarding all related applications. The specification has been amended to include information regarding all related foreign priority applications. It is respectfully submitted that this objection has now been overcome.

Rejection of claims 1-45 under the doctrine of obviousness-type double patenting

The Office Action states that claim 1 been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of co-pending U.S. Patent Application Serial No. 11/063,994 and claims 7 and 12 of co-pending U.S. Patent Application Serial No. 11/076,232. The Office Action further states that the concept of claims 2-45 has been disclosed in co-pending U.S. Patent Application Serial No. 11/063,994 and co-pending U.S. Patent Application Serial No. 11/076,232 and are also rejected.

Applicants elect to file a terminal disclaimer, which is included herewith, and submit that the double patenting rejection is now overcome.

Rejection of claims 1-45 under 35 U.S.C. § 112, first paragraph

The Office Action states that claims 1 and 45 contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. Specifically, the Office Action states that paragraphs [0047], [0055]-[0063], and [0316] mentions L-th order and M-th order diffracted light but does not explain what the L-th and M-th order lights are and how they relate to the wavelengths $\lambda 1$ and $\lambda 2$, and each other.

Applicants' amended independent claim 1 now recites that "the diffractive structure is a structure having a diffracting function for setting L-th (L≠0) order diffracted light of the light beam having the first wavelength λ1 to a maximum diffraction efficiency and for setting M-th (M≠0) order diffracted light of the light beam having the second wavelength λ2 to a maximum diffraction efficiency if the optical path difference giving structure does not exist on the optical surface of the diffractive structure".

As explained below with reference to Applicants' specification, the specification does sufficiently describe that the order of diffracted light having the maximum diffraction efficiency for the wavelength λ1 is denoted the L-th order and that the order of diffracted light having the maximum diffraction efficiency for the wavelength λ2 is denoted the M-th order, wherein the wavelengths λ1, λ2 are wavelengths of light used for two different optical information recording mediums, i.e., DVD and high density DVD.

As explained in Applicants' published specification, an infinite number of orders of diffracted light such as 0-th order diffracted light, +/- 1st order diffracted light, +/- 2nd order diffracted light, ...etc., are generally generated by light incident on an optical surface having diffracting ring-shaped zones (see paragraph [0045] of Applicants' published specification). However, when the shape of the diffracting ring-shaped zones is changed, the diffraction efficiency of the diffracted light of one of the diffraction orders can be set to be higher than that of another of the diffraction orders, and the diffraction efficiency of the diffracted light of one specific diffraction order (for example, +1st order diffracted light) can be set to approximately 100% (see paragraph [0045] of Applicants' published specification). The diffraction efficiency denotes a percentage of total light by one order of diffracted light caused by the diffracting ring-shaped zone. The sum of diffraction efficiencies of all diffracted lights is equal to 1 (see

paragraph [0046] of Applicants' published specification). In other words, the amount of the diffracted light of one specific order of diffracted light can be controlled by changing the shape of the diffractive structure. When two light fluxes having different wavelengths are used, i.e., wavelength λ1 for high density DVD and wavelength λ2 for DVD (see e.g., paragraph [0196] of Applicants' published specification), the diffraction efficiency of each of the light fluxes can be controlled by changing the shape of the diffractive structure. Further, the diffracted light having the maximum diffraction efficiency of each light flux can be selected by controlling the shape of the diffractive structure.

Paragraph [0047] of Applicants' published specification further explains: "The L-th (or M-th) order diffracted light having the maximum diffraction efficiency denotes the L-th (or M-th) order diffracted light in which the diffraction efficiency is theoretically highest among diffraction efficiencies of all diffracted lights when the light beam having the wavelength λ1 (λ2) is incident on the optical element." In other words, the order of diffracted light having the maximum diffraction effiency is denoted as the L-th order for wavelength λ1 and the order of diffracted light having the maximum diffraction efficiency is denoted as the M-th order for wavelength λ2.

As is described in the "Description of Related Art" section of the published application (see paragraphs [0008]–[0014]), a diffractive structure is well known in the art. A person skilled in the art can control the diffraction efficiency of the predetermined diffracted light, and control the orders of the diffracted lights having the maximum diffractive efficiency, in accordance with an intended use of the diffracted light, in response to the wavelength of the utilized light fluxes by adjusting the structure (especially the depth) of the diffractive structure. Other examples for

diffractive structures can be found in paragraphs [0224]-[0260] of Applicants' published specification and in USP 6,870,805 and USP 6,118,594.

The recitation "the diffractive structure is a structure having a diffracting function for setting L-th ($L \neq 0$) order diffracted light of the light beam having the first wavelength $\lambda 1$ to a maximum diffraction efficiency and for setting M-th ($M \neq 0$) order diffracted light of the light beam having the second wavelength $\lambda 2$ to a maximum diffraction efficiency" in Applicants' independent claim 1 means that both of the diffraction order of the diffracted light having maximum diffraction efficiency of the first light flux and the diffraction order of the diffracted light having maximum diffraction efficiency of the second light flux are set to be other than the 0-th order. This means that the diffraction efficiency of the 0-th order diffracted light is not the dominant component for the both of the different lights.

Typically, the wavelength used in an optical system is firstly determined in association with the standard of the recording medium. In the present example, the wavelengths used are for high density DVD and DVD. The diffraction order of the diffracted light having the maximum diffraction efficiency is selected in view of the wavelength, the balance of the diffraction efficiency of each of the light fluxes, and the required characteristics as the optical element (e.g., compensation of spherical aberration due to the substrate thickness of recording medium, compensation of axial aberration due to the difference in the wavelength, etc). Further, since the two light fluxes recited in independent claim 1 have the different wavelengths ($\lambda 2 > \lambda 1$), the maximum diffraction efficiencies of each of the two light fluxes can be selected independently because of the wavelength dependency of the diffractive structure.

In view of the above comments, Applicants submit that the specification sufficiently explains what the L-th and M-th order diffracted lights are and how they relate to the

wavelengths λ1 and λ2 and each other such that one skilled in the art would be able to make and/or use the invention.

The Office Action further states that the phrase "an assumption of no existence of the optical path difference giving structure" recited in claim 1 is not defined. The Office Action further states that the word "assumption" is not clear, that the limits of the "assumption" are not clear.

Independent claims 1 and 36 have been amended to recite "wherein the diffractive structure is a structure having a diffracting function for setting L-th ($L \neq 0$) order diffracted light of the light beam having the first wavelength λ1 to a maximum diffraction efficiency and for setting M-th ($M \neq 0$) order diffracted light of the light beam having the second wavelength λ2 to a maximum diffraction efficiency if the optical path difference giving structure does not exist on the optical surface of the diffractive structure".

Referring to Fig. 2 of Applicants' specification, the diffractive structure 20 and the optical path difference giving structure 30 are integrally provided on an optical surface of the objective optical element 10 (see paragraph [0204] of Applicants' published specification). The light flux passing through the objective optical element is affected by both the diffractive structure 20 and the optical path difference giving structure 30. The portion of amended independent claim 1, which recites, "if the optical path difference giving structure does not exist on the optical surface of the diffractive structure" refers to the case where only the diffractive structure 20 is provided on the objective optical element (such as, for example, the structure shown in Fig. 3B and described in paragraph [0208]). Therefore, the last paragraph in independent claim 1 refers to the function of the diffractive structure 20 by itself before the optical path difference giving structure 30 is provided.

In view of the forgoing, it is respectfully submitted that the rejections under 35 U.S.C. § 112, first paragraph have now been overcome and should be withdrawn.

Rejections of claims 1-45 under 35 U.S.C. § 112, second paragraph

The Office Action states that claims 1 and 36 fail to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Office Action states that it is not clear what are the meets and bounds of the claim language which claims L-th and M-th order diffracted light. The Office Action further states that it is not clear what number L or M represents or how the number relates to wavelength.

Applicants' amended independent claim 1 now recites that "the diffractive structure is a structure having a diffracting function for setting L-th ($L \neq 0$) order diffracted light of the light beam having the first wavelength $\lambda 1$ to a maximum diffraction efficiency and for setting M-th ($M \neq 0$) order diffracted light of the light beam having the second wavelength $\lambda 2$ to a maximum diffraction efficiency if the optical path difference giving structure does not exist on the optical surface of the diffractive structure".

As explained below with reference to Applicants' specification, the specification does sufficiently describe that the order of diffracted light having the maximum diffraction efficiency for the wavelength $\lambda 1$ is denoted the L-th order and that the order of diffracted light having the maximum diffraction efficiency for the wavelength $\lambda 2$ is denoted the M-th order, wherein the wavelengths $\lambda 1$, $\lambda 2$ are wavelengths of light used for two different optical information recording mediums, i.e., DVD and high density DVD.

As explained in Applicants' published specification, an infinite number of orders of diffracted light such as 0-th order diffracted light, +/- 1st order diffracted light, +/- 2nd order

diffracted light, ...etc., are generally generated by light incident on an optical surface having diffracting ring-shaped zones (see paragraph [0045] of Applicants' published specification). However, when the shape of the diffracting ring-shaped zones is changed, the diffraction efficiency of the diffracted light of one of the diffraction orders can be set to be higher than that of another of the diffraction orders, and the diffraction efficiency of the diffracted light of one specific diffraction order (for example, +1st order diffracted light) can be set to approximately 100% (see paragraph [0045] of Applicants' published specification). The diffraction efficiency denotes a percentage of total light by one order of diffracted light caused by the diffracting ring-shaped zone. The sum of diffraction efficiencies of all diffracted lights is equal to 1 (see paragraph [0046] of Applicants' published specification). In other words, the amount of the diffracted light of one specific order of diffracted light can be controlled by changing the shape of the diffractive structure. When two light fluxes having different wavelengths are used, i.e., wavelength $\lambda 1$ for high density DVD and wavelength $\lambda 2$ for DVD (see e.g., paragraph [0196] of Applicants' published specification), the diffraction efficiency of each of the light fluxes can be controlled by changing the shape of the diffractive structure. Further, the diffracted light having the maximum diffraction efficiency of each light flux can be selected by controlling the shape of the diffractive structure.

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diffracted light having the maximum diffraction efficiency is denoted as the M-th order for wavelength λ2.

As is described in the "Description of Related Art" section of the published application (see paragraphs [0008]–[0014]), a diffractive structure is well known in the art. A person skilled in the art can control the diffraction efficiency of the predetermined diffracted light, and control the orders of the diffracted lights having the maximum diffractive efficiency, in accordance with an intended use of the diffracted light, in response to the wavelength of the utilized light fluxes by adjusting the structure (especially the depth) of the diffractive structure. Other examples for diffractive structures can be found in paragraphs [0224]-[0260] of Applicants' published specification and in USP 6,870,805 and USP 6,118,594.

The recitation "the diffractive structure is a structure having a diffracting function for setting L-th (L≠0) order diffracted light of the light beam having the first wavelength λ1 to a maximum diffraction efficiency and for setting M-th (M≠0) order diffracted light of the light beam having the second wavelength λ2 to a maximum diffraction efficiency" in Applicants' independent claim 1 means that both of the diffraction order of the diffracted light having maximum diffraction efficiency of the first light flux and the diffraction order of the diffracted light having maximum diffraction efficiency of the second light flux are set to be other than the 0-th order. This means that the diffraction efficiency of the 0-th order diffracted light is not the dominant component for the both of the different lights.

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efficiency of each of the light fluxes, and the required characteristics as the optical element (e.g., compensation of spherical aberration due to the substrate thickness of recording medium, compensation of axial aberration due to the difference in the wavelength, etc). Further, since the two light fluxes recited in independent claim 1 have the different wavelengths ($\lambda 2 > \lambda 1$), the maximum diffraction efficiencies of each of the two light fluxes can be selected independently because of the wavelength dependency of the diffractive structure.

In view of the above description, Applicants submit that it is clear what L or M represent and how they relate to wavelength.

The Office Action further states that the phrase "an assumption of no existence of the optical path difference giving structure" in claim 1 is not defined and that the word "assumption" makes the claims indefinite.

Independent claims 1 and 36 have been amended to recite "wherein the diffractive structure is a structure having a diffracting function for setting L-th ($L \neq 0$) order diffracted light of the light beam having the first wavelength $\lambda 1$ to a maximum diffraction efficiency and for setting M-th ($M \neq 0$) order diffracted light of the light beam having the second wavelength $\lambda 2$ to a maximum diffraction efficiency if the optical path difference giving structure does not exist on the optical surface of the diffractive structure".

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In view of the forgoing, it is respectfully submitted that the rejections under 35 U.S.C. § 112, second paragraph, have now been overcome and should be withdrawn.

Conclusion

In view of the foregoing, reconsideration and withdrawal of all rejections, and allowance of all pending claims is respectfully solicited.

Should the Examiner have any comments, questions, suggestions, or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

Respectfully submitted,

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